SUPPORT FOR THE AMENDMENTS

Support for the amendment of Claim 4 is found on page 9, lines 1-6, Fig. 1, and page 9, lines 9-10, in the specification.

Claim 5 is amended to eliminate the parenthetical expression, i.e., the "( )" marks are removed.

Support for Claim 10 is found beginning on page 8, line 20 and bridging to page 9, line 5, in the specification.

Support for Claim 11 is found on page 7, lines 5-7, in the specification.

Support for Claim 12 is found on page 7, lines 2-3, in the specification.

Support for Claim 13 is found on page 5, lines 23-24, in the specification.

Support for Claims 14 and 15 is found on page 5, lines 20-23, in the specification.

No new matter will be added to this application by entry of this application.

Upon entry of this amendment, Claims 1-15 are active. Claims 1-3 and 9 are withdrawn.

REQUEST FOR RECONSIDERATION

The claimed invention is directed to a method for the direct preparation of a pure ultra-fine SiO_x powder. Such powders are conventionally made by methods involving a special purification treatment in order to obtain high purity. High purity SiO_x powders are used for an interlayer film of a semiconductor, a gas barrier film on food packaging and protective films for optical components. A direct method to prepare SiO_x powder of high purity is sought.

The claimed invention addresses this problem by providing a method for producing a powder represented by the formula SiOx wherein x is from 0.6 to 1.8 and the powder has a

specific surface area of at least 10 m^2/g and a total content of Na, Fe, Al and Cl of at most 10 ppm which comprises reacting monosilane gas with a gas capable of oxidizing the monosilane gas in a non-oxidizing gas atmosphere under a pressure of from 10 to 1000 kPa at a temperature of from 500 to 1000°C, wherein in the reacting, the gas capable of oxidizing the monosilane gas is supplied to a high temperature part of a reactor without prior mixing with the monosilane gas, and the temperature of 500 to 1000°C is obtained by heating the reactor on its periphery. No such method is disclosed or suggested by the cited references.

Applicants wish to thank Examiner Liao and Supervisory Examiner Kim for the courteous and helpful discussion of this application with Applicants' U.S. representative on January 15, 2008. At that time, Applicants' U.S. representative reviewed the description of the cited references and specifically pointed out that Kumar mixes all the reaction gases outside the reactor and does not describe monosilane as the starting reactant. In addition, Kumar supplies heat to the reaction by laser excitation of a laser absorbing material within the reaction mixture. In contrast, the claimed invention employs monosilane as the starting reactant, does not mix the monosilane and oxidizing gas prior to entry to the reactor and heats the reactor on the periphery. The following reiterates and expands upon that discussion.

Applicants respectfully note that Claim 4 is herein amended to include the description:

> wherein in the reacting, the gas capable of oxidizing the monosilane gas is supplied to a high temperature part of a reactor without prior mixing with the monosilane gas, and the temperature of 500 to 1000°C is obtained by heating the reactor on its periphery.

The rejection of Claims 4-8 under 35 U.S.C. 103(a) over Kumar et al. (U.S. 6,726,990) in view of Golecki et al. (U.S. 6,896,968) is respectfully traversed.

The combined references neither disclose nor suggest the method according to Claim 4 of the presently claimed invention.

Kumar describes a method for producing silicon oxide nanoparticles involving laser pyrolysis and subsequently heating the particles produced by the laser pyrolysis under an oxidizing atmosphere at a temperature from about 400 to 800°C for a sufficient period of time to decolorize the particles (Col. 1, lines 49-54). According to the Kumar method, the silicon precursor is a compound with reasonable vapor pressure such as, for example, silicon tetrachloride, trichlorosilane, trichloro methylsilane and tetraethoxysilane (Col. 3, lines 31-40). The silicon precursor gas, oxygen source gas, carrier gas and radiation absorber gas are "**combined a sufficient distance from the reaction chamber 104 such that the gases become well mixed prior to their entrance into the reaction chamber 104.**" (Col. 4, lines 35-38)(Bold added)

According to the Kumar laser method the combined gases are supplied in a well mixed state to a reaction chamber in a molecular stream (Col. 4, lines 8-9). A laser beam intersects the molecular stream and the radiation absorber absorbs the energy and distributes it to the reactants (Col. 3, lines 53-56). The molecular stream exits the reaction chamber and passes to a collection chamber. The reference clearly indicates that the **particles formed in the laser beam are not of high purity and that the particles, following proper heat treatment can have a purity of at least 99.9 percent by weight silicon oxide** (Col. 9, lines 40-42). Kumar explains the necessity of the purification treatment in Col. 12, lines 32-39 as:

"The stoichiometry of the particles was not determined directly. The particles had a dark color upon visual inspection. The darkness may have been the result of oxygen deficiencies relative to silicon dioxide or to deposits on the particles of elemental carbon from the ethylene in the reactant stream. **The dark color was eliminated upon heating in an oxygen environment in an oven . . .**"(Bold added).

The Office has admitted that Kumar is deficient in each of the following: 1) does not teach a value of x of from 0.6 to 1.8; 2) does not teach a total Na, Fe, Al and Cl content

amounting to at most 10 ppm; 3) does not use SiH_4; and 4) does not teach a molar ratio of the non-oxidizing gas to gases in the oxidation process.

Golecki is cited to show SiH_4 as a precursor gas. This reference is directed to protective coatings for carbon containing components comprising non-stoichiometric materials consisting of silicon and carbon; silicon and oxygen; silicon and nitrogen; silicon, oxygen and carbon; silicon, oxygen and nitrogen; silicon, nitrogen and carbon; and **silicon.** The Office has cited Col. 3, lines 46-47, of this reference to show SiH_4 usage as a precursor for non-stoichiometric silicon oxide.

However, Applicants respectfully submit that careful reading of the cited text as reproduced following, clearly shows **SiH_4 is described as a precursor for a silicon coating**, not a SiO_xC_y coating as the Office has alleged.

> "Such coatings can be deposited using chemical precursors such as **silane (SiH_4) and hydrogen for Si**, and chemical precursors such as methylsilane ($SiCH_3H_3$) and nitrous oxide (N_2O) for SiO_xC_y or $SiO_xC_yN_z$ . ."

Applicants respectfully call the Examiner's attention to the following excerpt from the Office's own discussion of **"Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103 in View of the Supreme Court Decision in *KSR International Co. v. Teleflex Inc.*"**

> "The rationale to support a conclusion that the claim would have been obvious is that all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded nothing more than predictable results to one of ordinary skill in the art at the time of the invention.[43] ""[I]t can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does."[44] **If any of these findings cannot be made, then this rationale cannot be used to support a conclusion that the claim would have been obvious to one of ordinary skill in the art,"** (Federal Register, Vol. 72, No. 195, page 57529) **(Bold added)**

Applicants have shown and the Office has admitted that Kumar is deficient in disclosing or suggesting all the elements described in the method of the claimed invention as described in Claim 4 and claims dependent thereon. Moreover, it has been shown that Golecki does not cure any of the Kumar deficiencies. Therefore, Applicants respectfully submit that according to the guidelines above, a conclusion of obviousness cannot be supported.

Moreover, **Applicants have provided a significantly improved method** for the direct production of SiO_x powder of high purity without a subsequent purification treatment which is necessary in conventional technology and required by the method of Kumar. This improvement is clearly demonstrated in the Examples described in the specification and in Table 1.

Applicants respectfully note the Examiners' comments relative to the usage of "monosilane" in this application and point out that the term is defined as SiH_4 on page 4, line 19 in the specification. As Applicant is entitled to be his own lexicographer, the use of this term according to the definition in the specification is appropriate. Moreover, as indicated in the attached article entitled "Silane" from Wikipedia, the term is not inconsistent with the practice of using a prefix to specify the meaning of the term.

In view of the foregoing, Applicants respectfully request that the rejection of Claims 4-8 under 35 U.S.C. 103(a) over Kumar et al. in view of Golecki et al. be withdrawn.

Applicants respectfully note that during the discussion of this application with Applicants' U.S. representative, the Examiners indicated the wording of Claim 5 was understood and that the objection to Claim 5 would be withdrawn.

An IDS of proper format with the listing of Related Cases as filed October 4, 2004, is filed with this amendment. Applicants respectfully note the Examiners' agreement that the filing date of this document will remain as the original date indicated above.

Applicants respectfully submit that the above-identified application is now in condition for allowance and early notice of such action is earnestly solicited.

Respectfully submitted,

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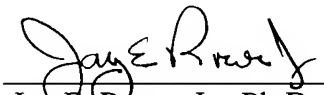
Norman F. Oblon



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